TOPO-EUROPE: Studying Continental Topography and Deep Earth – Surface Processes in 4D

Sierd Cloetingh and the TOPO-EUROPE science community

Netherlands Research Centre for Integrated Solid Earth Science (ISES), VU University Amsterdam De Boelelaan 1085, Amsterdam, 1081 HV, Netherlands (sierd.cloetingh@falw.vu.nl)

Topography influences various aspects of society, not only in terms of the slow process of landscape evolution but also through climate (e.g. mountain building). Topographic evolution (changes in land, water and sea level) can seriously affect human life, as well as terrestrial geo-ecosystems. When fresh water or sea-water levels rise, or when land subsides, the risk of flooding increases. This directly affects local geo- ecosystems and human settlements. On the other hand, declining water levels and uplift may lead to a higher risk of erosion and even desertification. Similar examples could be given for groundwater, early life and climate change. Studying these aspects in an integrated way is essential to forward solid Earth Sciences in response to the needs of society (see http://www.yearofplanetearth.org/). To quantify topography evolution in space and time, understanding of the coupled deep Earth and surface processes is a requisite. The TOPO-EUROPE initiative of the International Lithophere Program (ILP) addresses the 4-D topography of the orogens and intra-plate regions of Europe through a multidisciplinary approach linking geology, geophysics, geodesy and geotechnology. TOPO-EUROPE integrates monitoring, imaging, reconstruction and modelling of the interplay between processes controlling continental topography and related natural hazards. Until now, research on neotectonics and related topography development of orogens and intra-plate regions has received little attention. TOPO-EUROPE initiates a number of novel studies on the quantification of rates of vertical motions, related tectonically controlled river evolution and land subsidence in carefully selected natural laboratories in Europe. From orogen through platform to continental margin, these natural laboratories include the Alps/Carpathians-Pannonian Basin System, the West and Central European Platform, the Apennines-Tyrrhenian-Maghrebian and the Aegean-Anatolian regions, the Iberian Peninsula and the Scandinavian Continental Margin. TOPO-EUROPE integrates European research facilities and know- how essential to advance the understanding of the role of topography in Earth System Dynamics. The principal objective of the network is twofold. Namely, to integrate national research programs into a common European network and, furthermore, to integrate activities among TOPO-EUROPE institutes and participants. Key objectives are to provide an interdisciplinary forum to share knowledge and information in the field of the neotectonic and topographic evolution of Europe, to promote and encourage multidisciplinary research on a truly European scale, to increase mobility of scientists and to train young scientists. An important step has been the selection in early 2008 by the European Science Foundation (ESF) of TOPO-EUROPE as one of its large scale European collaborative research initiatives (EUROCORES). In response to the ESF call for proposals, 42 outline proposals were submitted, resulting in 22 full proposals submitted for international peer-review. Out of these, ten collaborative research projects (CRP's) were selected for the ESF EUROCORES TOPO-EUROPE, with a total funding of 13 million Euro (M$ 18) and new research positions for more than 50 PhD students and post-doctoral researchers.